



## Welcome to the New *Environmental Health Perspectives*

Welcome to the first issue of the new *Environmental Health Perspectives*: it looks a lot different from the original journal, but the tradition of dedication to good science remains unchanged. We have published 100 volumes of *EHP* and this, volume 101, is a new beginning. We have changed formats and provided new ones to accommodate the numerous varieties and forms that scientific information can take. We want to publish the very best environmental health research and at the same time provide a forum for discussion and dissemination of information about what is going on in the environment.

We want our readers to contribute to this enterprise by submitting research manuscripts, writing letters, and sending us news. Your involvement is particularly important because we believe that many environmental problems have arisen today because of inadequate communications in the past. Traditionally, laboratory researchers have tended to communicate primarily with each other, and the dissemination of information to the public has been slow and haphazard. It is clear that enhanced communications could contribute to the avoidance of environmental crises through both increased understanding of the underlying science and the identification of potential problems before they become overwhelming, expensive, and perhaps irreversible.

This is the age of information, and we want *EHP* to be a focal point, a forum, and a node through which environmental health issues are identified, examined, and resolved. In view of these ambitions it is appropriate that the date on the cover of our first issue be April 22, 1993, the 23rd Anniversary of Earth Day. We are pleased to contribute to the celebration of Earth Day 1993 by the inauguration of our revised journal dedicated to the health of the environment. Our cover is a symbol of our focus, the planet earth. Our cover provides a perspective of our planet reminding us that the earth is finite in its scope, finite in its resources, and finite in its ability to sustain life. Let us work together to make our planet a good place to live; after all, it is the only home we have.

Gary E. R. Hook and George W. Lucier  
Editors-in-Chief

## Opportunities in Environmental Health Science Research

The National Institute of Environmental Health Sciences and the National Toxicology Program have important roles in preventing human disease and containing the spiraling health and regulatory costs of the nation. The coalescence of toxicological testing with basic and mechanistic research brings the full range of scientific inquiry to bear on studies of the environment and human disease. The explosion of new knowledge and technology over the past 25 years provides the NIEHS/NTP with the tools necessary to hasten the understanding of the interactions between the environment and individual genetic susceptibility. This new knowledge can be applied to advance the fields of environmental medicine, public health, environmental protection, and risk assessment.

Environmental agents to which humans are exposed from conception to death can have significant health effects. The contribution of the environment to human disease and dysfunction is unknown, in part because environmentally related effects involve complex interactions between environment and genetic constitution over the course of many years. The interplay among the environment, genes, and time in the etiology or progression of human diseases and dysfunctions significantly complicates population-based environmental studies and makes it difficult to establish causal relationships.

The NIEHS/NTP has always operated on the principle that the Institute's research programs should be responsive and relevant to the needs of Americans without sacrificing the quality of research excellence or inhibiting innovation. The past 18 months has been marked by extensive review and strategic planning to make certain that cutting-edge technologies are used to address a broad spectrum of human health problems related to the environment. In addition to the input of various advisory panels, meetings were held with many representatives from Congress, Executive Branch agencies, environmental and labor groups, private and public health care practitioners, industry groups, academic researchers, and concerned citizens to understand their perceptions of the role and potential of NIEHS/NTP to address their needs and concerns. Based on these discussions and reviews, NIEHS/NTP has established new research priorities that emphasize two critical areas of science: basic biology and the environment and molecular prevention/intervention. Additionally, the toxicological testing program will be expanded to include testing a larger number of environmental agents and the development of a more experimental, hypothesis-driven research component [see Olden (1) for a more extensive discussion of the toxicological testing program].

New and expanded research into environmental influences on human health must be carried out if we are to understand the full range of biological processes and disease states of clinical importance. Therefore, consideration of environmental agents as causes of human diseases must be accorded a high priority in establishing the nation's health research agenda. To understand environmentally associated human diseases, we need a better knowledge of how chemical messages that originate outside the cell can modulate cell function by switching genes on and off or by modulating signal transduction pathways. In addition to understanding the nature of the molecular/cellular interactions with environmental agents, we must relate the molecular or cellular effects to the health status of the human organism.

Numerous environmental agents have been identified that interact with and damage DNA; this may represent an important mechanism underlying many human diseases and dysfunctions. Because genes and the proteins they encode are responsible for all cellular function, control, communication, and regulation, the interactions of environmental agents with genes and gene products can lead to disruption of critical biological functions. However, susceptibility of biological systems to environmental perturbation is likely to be highly variable because the genetic make-up of each individual is different. The ability of electrophilic chemicals to damage DNA and cause mutations has been demonstrated for many chemicals, yet there are chemical teratogens and carcinogens that show no propensity for interacting with or altering DNA. Several of these chemicals have been shown to interact with receptor proteins and perturb signal transduction systems involved in cellular growth and differentiation. This phenomenon and other

hypotheses for the mechanisms by which environmental agents can be involved in the disease process will be investigated by NIEHS/NTP.

Thus, NIEHS has assigned high priority to identifying critical genes and gene products involved in the environmental contribution to impairing biological events that result in human disease and disability. Such genes include oncogenes and tumor-suppressor genes, genes responsible for programmed cell death, cell differentiation, and DNA repair, and genes responsible for differences in individual susceptibility. Issues such as polymorphism in drug-metabolizing and DNA repair enzymes and the role of gender and age in enhancing or protecting against effects of environmental exposures have also been assigned high priority. For example, the development of biomarkers that can quantify individual exposure, the effect of that exposure, and the likelihood of susceptibility to that exposure would greatly improve our ability to prevent adverse health effects from exposure to environmental factors. The mechanistic data generated from such studies can be used to improve human risk assessment and to design prevention and intervention strategies with improved efficacy.

Historically, prevention efforts in environmental public health have been dominated by behavioral, engineering, and regulatory approaches aimed at eliminating exposure to toxic substances. Although these efforts are entirely appropriate and necessary as humane and cost-effective interventions, the elimination of exposure to many ubiquitous environmental hazards may take decades to achieve, even if the resources and trained workforce were immediately available. Thus, there is a need to develop new molecular approaches to prevention and intervention based on knowledge of the mechanisms of disease etiology.

Human health and disease are outgrowths of molecular events. Understanding the basic biology of the molecular event offers considerable promise for preventing disease. With increased opportu-

nities for elucidating the role of the environment in the etiology of human disease, we should soon be able to modify or manipulate both gene products and environmental exposures or effects to prevent disease or to intervene in their progression before they become debilitating. Possibilities include the design of receptor blockers to intercept adverse effects of receptor-mediated environmental toxicant action, development of molecules that could "turn off" activated oncogenes before they lead to neoplastic disease, identification of molecules that could "turn on" tumor-suppressor genes or DNA repair mechanisms to block disease progression, and development of antimetabolites to block the generation of active toxicants in biological systems.

Molecular prevention and intervention offer real savings both in terms of human suffering and in containing health costs associated with treatment of end-stage disease and rehabilitation. Research areas to be emphasized include development of biomarkers of exposure, effect, and susceptibility, development of a better understanding of growth regulation, and development of animal models to replicate both early and late events in disease pathogenesis.

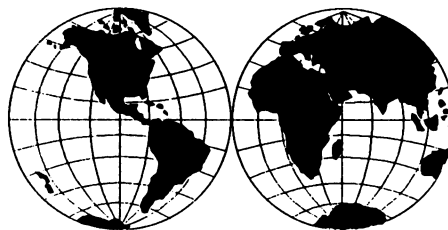
**Kenneth Olden**

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#### REFERENCE

1. Olden K. Environmental health science research and human risk assessment. *Regul Toxicol Pharmacol* 17 (in press).



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